AUTOMATIC PET FEEDER WITH CLIENT/SERVER APPLICATION

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A thesis submitted in fulfilment of the
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"I hereby acknowledge that the scope and quality of this thesis is qualified for the award of the Bachelor Degree of Electrical Engineering (Electronics)"

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To my beloved father, Mohd Yakop B. Abd Hamid and mother, Siti Mariam Bt. Ismail
Who always pray for me and give me courage to finish this thesis.

And also to those people who have guided and inspired me throughout my journey.
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ABSTRACT

This project explains about designing and developing an automatic pet feeder that comes with the client/server application. Not like the ordinary pet feeding product in the market today that requires the user to set the times of feeding, this automatic pet feeder use the ultrasonic sensor that placed in front of the device to sense the presence of the pet. The purpose and concept of this project is the same with other device like it, to feed the pet without the present of the owner. This project was developed using Motorola MC68HC11A1P microcontroller that play the role as the main controller system. The microcontroller used in this project is programmed using assembly language. The microcontroller controls the rotation of the motor and send signal to the server computer to update the database at the server. The server and client application for this project is developed using Visual Basic 6.0 software. Finally, this project allows the user to view the information about the feeding from other computer where internet becomes the medium of interaction.

ABSTRAK

Projek ini menerangkan tentang langkah mereka dan membangunkan sebuah pemberi makanan binatang peliharaan automatik yang datang bersama applikasi pelangan/pelayan. Tidak seperti pemberi makanan binatang peliharaan automatik yang berada di pasaran hari ini yang memerlukan penguna untuk menetapkan masa pemberian makanan, pemberi makanan automatik ini menggunakan pengesan ultrasonik di hadapannya untuk mengesan kehadiran binatang peliharaan. Tujuan dan konsep projek ini adalah sama seperti alat lain sepertinya iaitu memberi makanan kepada binatang peliharaan tanpa kehadiran pemilik. Projek ini dibangunkan menggunakan pengawal mikro Motorolla MC68HC11A1P yang memainkan peranan sebagai pengawal utama keseluruhan system. Pengawal mikro yang digunakan dalam projek ini diprogram menggunakan bahasa pengaturcara. Pengawal mikro yang digunakan mengawal pusingan motor dan menghantar isyarat kepada komputer pelayan untuk mengemaskini data didalamnya. Applikasi pelangan dan pelayan untuk projek ini dibangunkan menggunakan perisian Visual Basic 6.0. Akhirnya, projek ini membenarkan pengguna untuk mendapatkan informasi tentang proses pemberian makanan menggunakan komputer lain dimana internet menjadi medium untuk berinteraksi.

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INTRODUCTION

1.1 Background

Pet care should be fun, not burdensome and so the goal of this project is to assist owner with pet care by providing an automatic pet feeder. The purpose of the project helps the owner of the pet feeding their pet on time even when they are not at home. Other than that, it also can help the owner know the diet of their pet. Knowing the diet of the pet is very important for the owner to make sure that the pet is in good health.

This system assist pet owner to feed the pet. The system act in two ways, one is feeding the pet and sends the feeding information to owner. After it feed the pet, the system will stop responding for certain time in order to make sure that the pet do not eat too much.

1.2 Objective of Project

The objectives of this project are:-

i. To create a device that can automatically feed pets without the present of the owner by developing a microcontroller based system that response to the ultrasonic sensor, connected to a PC (server).
ii. To develop a client/server application using Visual Basic.

1.3 Problem Statement

It is common to know that pet care is a burden to the pet owner. Any pet need to be taken care and the owner need to be there to take care of them. Some pet cannot control their diet and will eat as long as there's food for them. Other pet will just eat a certain type of food. In other word, the owner cannot leave the pet on its own.

The problem occurs when the owner has to leave their pet for certain time and there's no one there to watch them. Therefore to solve the problem, system that can automatically feed the pet without the presence of the owner is needed to make sure that the pet stay healthy.

1.4 Scope of Project

The system is built using:

i. MC68HC11A1P microcontroller
ii. The Permanent Magnet Stepper Motor as the output from the controller.
iii. Visual Basic 6.0 as the main software development program.
iv. Ultrasonic sensor as the input of the system.

1.5 Methodology

Step taken to archive the objectives of this project are:

- Studies on the hardware that needed for this project such as controller, motor, ultrasonic sensor and others.

- Do studies on the compatible software that available and related to the project in order to perform certain tasks like developed GUI, used internet services and others.

- Designing the hardware of the project such as microcontroller circuit and ultrasonic sensor based on the literature review that has been done.

- Do simulation for the program that will be burn into the microcontroller to make sure that the program work as wanted.

- Designing the client/server application using the software that has been decided.

- Communication test between the hardware and the software used in this project to make sure it operates as a system.

- Integrate the software and hardware to complete the project.

- Collect result get from the test and simulation that has been done.

- Analysis the data in order to make sure that the system work perfectly.

1.6 Thesis Outline

This thesis contains five chapters. Chapter 1 is about the introduction of the project which consists of background, problem statement, scopes, methodology, objectives of the project and also the thesis outline.

Chapter 2 provides a literature review on sending data using client/server application in general and discusses about controlling motor using microcontroller and how it can be integrated with the server as the control panel. This chapter is based on the journal and other reference that has been use to complete this project.

Chapter 3 discusses all about the design system of the project. This chapter includes step by step explanation on implementing ideas onto the hardware that has been chosen. Then creating the graphical user interfaces (GUI) for PC server and PC client until all of the components combined together as one perfect system.

Chapter 4 will be the outcomes or result from the project which consists of figure of the hardware project, table of simulation result and other related stuff. The discussion focused on the result is base on the experiment.

Finally, chapter 5 explains the summary of the project where it concludes overall of the project, obstacle faces and some recommendations for future development.

CHAPTER 2

LITEATURE REVIEW

2.1 Introduction

In completing this project, some literature review has been done on several resources. The theories and descriptions have been taken as guidance in completing this project. This chapter will present and give an overview about some application that use client/server application, the use of ultrasonic motion detector and other related project that use microcontroller as the main controller.

2.2 Visual Basic

Visual Basic (VB) is the third-generation event-driven programming language and integrated development environment (IDE) from Microsoft for its COM programming model. VB is also considered a relatively easy to learn and

use programming language, because of its graphical development features and BASIC. [Wikipedia, 2008]. It is easier to do the programming using Visual Basic because it is an Object Oriented Programming.

A specific button can be program using the Visual Basic application. The position of the buttons and other components can be adjusted without using a coding. Visual Basic program display a Windows style screen (called a form) with a boxes into which users type (and edit) information and buttons that they click to initiates action. The buttons and boxes are referred to as control. Forms and control are called objects.[D.I Schneider, 1999].

2.3 Client/Server Application

A client/server application is a piece of software that runs in client computer and make request to a remote server. Many such application are written in high level visual programming language where the user interface, forms and most business logic reside in the client application. Often the server act as the database and the client is a program that requesting data or info.

Client/server describes the relationship between two computer programs in which one program, the client, makes a service request from another program, the server.[Wikipedia, 2008]. In order to develop this unit, knowledge in some of software programming such as Visual Basic are required.

Client is a program that initiates request to the remote server. After request is made, the client will waits for replies from the server. The clients are usually connected to small number of server at a time and typically interact directly with end user using Graphical User Interface. Server in other hand is a program that will never initiates request. It just waits for request and response to request from connected client. The server can remotely install or uninstall application and transfer data to the client.

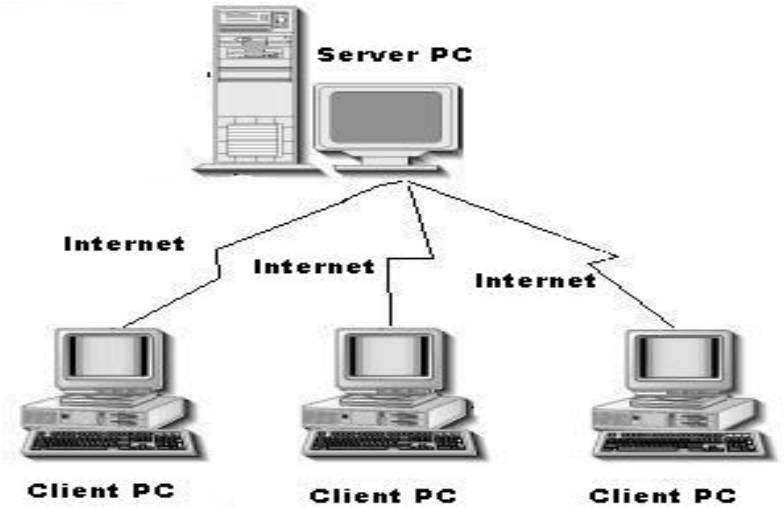

Figure 2.1: Overview of client/server application

2.4 Microcontroller

There are many types of microcontroller used in the market as the control unit for various types of application. The suitable microcontroller is chosen by the industries based on their need. In this project, the microcontroller acts as the

brain of the system because it controls all the action made by the system. In this project, 6811 microcontroller is used.

Microcontrollers store their programs and data in memory. Memory is organized as a contiguous string of addresses, or locations. Each memory location contains eight bits of data. The entire amount of memory that a processor can access is called its address space. [Motorola Incorporation, 1996]. The 6811 has an address space of 65,536 memory locations, corresponding exactly to 16 bits of address information. This mean that a 16-bit numeral can be used to point at, or address, any of the memory bytes in the address space of the 6811.

2.5 Introduction to Serial Port

Two standards of interface between PCs and other devices are parallel and serial port communications. Parallel port communication sends data at the same time while serial communication port sends data in a serial fashion. Communication between HC11 board and the PC is through serial port for the reason that the HC11 board already has existing serial communication IC chips. A serial port is a serial communication physical interface through which information transfers in or out one bit at a time (contrast parallel port). [Wikipedia, 2008]. Figure 2.2 shows the DB9 pin out connector.

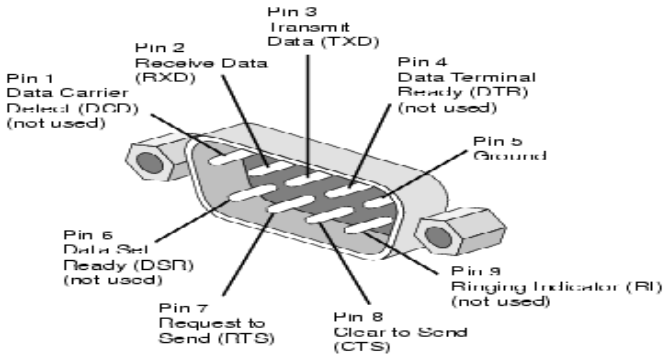

Figure 2.2: RS232 DB9 pin out.

2.5.1 Hardware

The RS232 connector was originally developed to use 25 pins. On personal computers, the smaller **DB9** version is more commonly used today.[Lammertbies, 2008]. The most used pin in DB9 is pin2 (RXD), to receive data and pin 3 (TXD), to transmit data. Usually male DB9 is attached to the PC and female DB9 is attached to the device.

2.6 Stepper Motor

A stepper motor is an electromagnetic device that converts digital pulses into mechanical shaft rotation. The shaft or spindler of stepper motor rotates in discrete step increments when electrical command pulses are applied to it in a proper sequence. [Solarbotics, 2008]. The sequence of the applied pulses is directly related to the direction of motor shafts rotation. The speed of the motor shafts rotation is directly related to the frequency of the input pulses and the length of rotation is directly related to the number of input pulses applied